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09/228,772	01/06/1999	JACOB BENESTY	BENESTY21613	8127

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EXAMINER	
TRAN, CON P	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

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Office Action Summary	Application No. 09/228,772	Applicant(s) BENESTY ET AL.	
	Examiner Con P. Tran	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: On page 19, line 11, a closed parenthesis ")" is missing in formula (52).

Appropriate correction is required.

Claim Objections

2. Claim 13 is objected to because of the following informalities: A closed parenthesis ")" is missing in formula of claim 13. Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. **Claims 1 and 11** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claims 1 and 13** of U.S. Patent No. 6,377,682. Although the conflicting claims are not identical, they are not patentably distinct from each other because elimination of method and steps provides no patentable difference. Claims 1 and 11 are encompassed by claims 1 and 13 of U.S. Patent No. 6,377,682. It is well settled that elimination of element and its function is considered to be obvious to one of ordinary skill in the art. In re Karlson, 136 USPQ 184 (CPA 1963).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. **Claims 1-2 and 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300.

Regarding **claims 1 and 11**, Romesburg teaches a robust adaptive filter (430; see col. 16, lines 44-60; see Fig. 4, and respective portions of the specification), comprising:

a fast impulse response filter (450; see col. 12, lines 14-33);

a coefficient vector update device (455) connected to the fast impulse response filter for feeding adaptive coefficients thereto in response to a received error signal (see col. 13, lines 26-57); and

a modifying device (470) for modifying the adaptive coefficients $h_0(n)$... $h_0(n-1)$ by using a peak-to-baseline device 495, a scale-offset-and-limit device 440, and a scaling device 420 (see col. 13, lines 58-63, and NLP of MATLAB Script in col. 21-22). Romesburg reference does not explicitly disclose adaptive scaled non-linearity.

However, Romesburg teaches in near-end single talk, double-talk and high near-end noise situations, a more conservative approach is used so that the adaptive filter does not become unstable or cause distortion in the near-end speech and noise signals. In either event, the update gain is reduced as the adaptive filter converges to match a prevailing steady-state echo environment so that erroneous perturbations of an already properly adapted filter are minimized (col.2, lines 56-63). A relatively high variable update gain is applied during unconverged, far-end single-talk situations by employing a modified form of the well known normalized least-mean-squares (NLMS) approach. In other unconverged situations, the update gain is adjusted more conservatively based on a normalized version of the system status gauge. By dynamically providing relatively large update gains while being careful not to create system instabilities, the exemplary embodiments quickly and robustly adapt to successfully cancel echoes in a wide variety of system conditions and environments (col.3, lines 1-11). The described performance is the same function as of an adaptive scaled non-linearity. Therefore it would be

obvious to consider the modifying device (470) having a function of an adaptive scaled non-linearity application.

Thus the language of **claims 1**, and **11**, "adaptive scaled non-linearity" are met.

Claim 2, also met since Romesburg further teaches an adaptive filter utilizing a fast converging adaptive algorithm (see col. 20, line 65 –col. 21, line 14).

Regarding **claim 12**, Romesburg further teaches the echo canceller of claim 11, further comprising a double talk detector connected to the telephone circuit for disabling the update device in response to the detection of double talk on the circuit (see col. 5, line 45-47)

7. **Claims 3 and 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300 in view of Duttweiler U.S. Patent 5,951,626

Regarding **claim 3**, Romesburg teaches a filter as claimed in claim 2. However, the Romesburg reference does not explicitly disclose the filter that the fast converging algorithm is PNLMS. Romesburg discloses a relatively high variable update gains are applied in unconverged, far-end single-talk situations by employing a modified normalized least-mean-squares (NLMS) algorithm.

Thus one of ordinary skill would have been motivated to seek a fast converging algorithm being PNLMS in order to supply an actual working filter for Romesburg. Such

embodiments would have been any known filter such as one of Duttweiler in the same field of endeavor.

Duttweiler teaches (see Fig. 1, 2, and respective portions of the specification) an adaptive filter (100) that the fast converging algorithm is PNLMS (see col. 4, lines 15-47) in order to distribute adaptive energy evenly across the tap (see col. 1, lines 53-54).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg reference an adaptive filter (100) that the fast converging algorithm is PNLMS (see col. 4, lines 15-47) as taught by Duttweiler since such combination would have distributed adaptive energy evenly across the tap as suggested by Duttweiler in column 1, lines 53-54.

Regarding **claim 4**, the combination of Romesburg and Duttweiler further teaches a filter as claimed in claim 2, wherein the fast converging algorithm is PNLMS++ (see: Romesburg col. 20, line 65 – col. 21, line 14; Duttweiler col. 4, lines 15-47).

8. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300 in view of Gay U.S. Patent No. 5,428,562.

Regarding **claim 5**, Romesburg teaches a filter as claimed in claim 2. However, the Romesburg reference does not explicitly disclose the filter that the fast converging algorithm is APA. Romesburg discloses a relatively high variable update gains are

applied in unconverged, far-end single-talk situations by employing a modified normalized least-mean-squares (NLMS) algorithm.

Thus one of ordinary skill would have been motivated to seek a fast converging algorithm being APA in order to supply an actual working filter for Romesburg. Such embodiments would have been any known filter such as one of Gay in the same field of endeavor.

Gay teaches an adaptive filter that the fast converging algorithm is APA (see col. 2, lines 53-65) in order to achieve fast convergence through sample-by-sample updating with low complexity (see col. 1, lines 46-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg reference an adaptive filter that the fast converging algorithm is APA (see col. 2, lines 53-65) as taught by Gay since such combination would have achieved fast convergence through sample-by-sample updating with low complexity as suggested by Gay in column 1, lines 46-47.

9. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300 in view of Oh et al. U.S. Patent 6,137,881.

Regarding **claim 6**, Romesburg teaches a filter as claimed in claim 2. However, the Romesburg reference does not explicitly disclose the filter that the fast converging algorithm is PAPA. Romesburg discloses a relatively high variable update gains are

applied in unconverged, far-end single-talk situations by employing a modified normalized least-mean-squares (NLMS) algorithm.

Thus one of ordinary skill would have been motivated to seek a fast converging algorithm being PAPA in order to supply an actual working filter for Romesburg. Such embodiments would have been any known filter such as one of Oh et al. in the same field of endeavor.

Oh et al. teaches an adaptive filter that the fast converging algorithm is PAPA (see col. 2, line 47 – col. 3, line 17) in order to improve the numerical stability of the filter algorithm (see col. 1, lines 48-49).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg reference an adaptive filter that the fast converging algorithm is PAPA as taught by Oh since such combination would have improved the numerical stability of the filter algorithm as suggested by Oh in column 1, lines 48-49.

10. **Claims 7-8 and 9-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300 in view of Duttweiler U.S. Patent 5,951,626, further in view of Fujii et al. U.S. Patent 5,790,440, and further in view of Kim and Efron ("Adaptive Robust Impulse Noise Filtering," IEEE Transaction on Signal Processing, Vol. 43, No. 8, pp. 1855-1866, August 1995)

Regarding **claim 7**, Romesburg and Duttweiler teach a filter as claimed in claim 3. However, the Romesburg and Duttweiler in combination does not explicitly disclose the adaptive scaled non-linearity is a sign function. Thus one of ordinary skill would have been motivated to seek an adaptive scaled non-linearity is a sign function in order to supply an actual working filter for Romesburg and Duttweiler in combination. Such embodiments would have been any known sign function such as one of Fujii et al. in the same field of endeavor.

Fujii et al. teaches an adaptive scaled non-linearity is a sign function (see col. 33, lines 18-38) so that a coefficient adjustment may be maintained without being stopped by the extreme reduction of the coefficient adjusting amounts (see col. 8, lines 57-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg and Duttweiler an adaptive scaled non-linearity that is a sign function, as taught by Fujii, since such combination would have provided a coefficient adjustment that may be maintained without being stopped by the extreme reduction of the coefficient adjusting amounts as suggested by Fujii in column 8, lines 57-59.

It should be noted that the Romesburg, Duttweiler, and Fujii in combination fails to clearly teaches an adaptive scaled non-linearity that is given by:

$$\Psi\left(\frac{|en|}{s}\right) sign\{e_n\}s_n$$

wherein Ψ a hard limiter; and $\left(\frac{|en|}{s}\right)$ is the mean error divided by a scale factor; and $\{e_n\}$ is a sample of echo signal; and s_n is a scale factor.

Thus one of ordinary skill would have been motivated to seek an adaptive scaled non-linearity given as above in order to supply an actual working filter for Romesburg, Duttweiler, and Fujii in combination. Such embodiments would have been any known sign function such as one of Kim and Efron in the same field of endeavor.

Kim and Efron reference teaches an adaptive scaled non-linearity that is given by the above formula (see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) in order to obtain robust power spectral density estimate (see pp. 1866, left-hand column, paragraph 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the combination of Romesburg, Duttweiler, and Fujii an adaptive scaled non-linearity that is given by the above formula as taught by Kim and Efron since such combination would have obtained robust power spectral density estimate as suggested by Kim and Efron on page 1866, left-hand column, paragraph 1.

Regarding **claim 8,** Kim and Efron reference further teaches an adaptive scaled non-linearity (see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) given by:

$$\Psi\left(\frac{|en|}{s}\right) sign\{e_n\}s_n$$

wherein Ψ a hard limiter; and $\left(\frac{|en|}{s}\right)$ is the mean error divided by a scale factor; and $\{e_n\}$ is a sample of echo signal; and s_n is a scale factor.

Regarding **claim 9,** Kim and Efron reference further teaches an adaptive scaled non-linearity (see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) given by:

$$\Psi\left(\frac{|en|}{s}\right) sign\{e_n\}s_n$$

wherein Ψ a hard limiter; and $\left(\frac{|en|}{s}\right)$ is the mean error divided by a scale factor; and $\{e_n\}$ is a sample of echo signal; and s_n is a scale factor.

Regarding **claim 10,** Kim and Efron reference further teaches an adaptive scaled non-linearity (see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) given by:

$$\Psi\left(\frac{|en|}{s}\right) sign\{e_n\}s_n$$

wherein Ψ a hard limiter; and $\left(\frac{|en|}{s}\right)$ is the mean error divided by a scale factor; and $\{e_n\}$ is a sample of echo signal; and s_n is a scale factor.

11. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Romesburg U.S. Patent 6,185,300 in view of Oh, Linebarger, Priest, Raghothaman ("A fast affine projection algorithm for an acoustic echo canceller using a fixed-point DSP processor," ICASSP IEEE Int. Conf. Acoustics, Speech, and Signal Processing, 1997, pp. 4121-4124), further in view of Fujii et al. U.S. Patent 5,790,440, and further in view of Kim and Efron ("Adaptive Robust Impulse Noise Filtering," IEEE Transaction on Signal Processing, Vol. 43, No. 8, pp. 1855-1866, August 1995).

Regarding **claim 13**, Romesburg teaches a robust echo canceller (430; see col. 16, lines 44-60; see Fig. 4, and respective portions of the specification) comprising:

an adaptive filter for outputting an error signal in response to a detected echo signal (450; see col. 12, lines 14-33); and

means for supplying adaptive filter coefficients to the filter (see col. 13, lines 26-57).

However, the Romesburg reference does not explicitly disclose the coefficient update equation in form of:

$$h_{n+1} = h_n + \mu G_n X_n (X_n^T X_n + \delta I),^{-1} e_n$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; and e_n is a sample of echo signal.

Thus one of ordinary skill would have been motivated to seek a coefficient update equation in form as above in order to supply an actual working filter for Romesburg. Such embodiments would have been any known coefficient update equation such as one of Oh, Linebarger, Priest, Raghothaman in the same field of endeavor.

Oh, Linebarger, Priest, Raghothaman reference teaches coefficients given by

$$h_{n+1} \quad = h_n + \mu G_n X_n (X_n^T X_n + \delta I),^{-1} e_n$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; and e_n is a sample of echo signal,

(see pp. 4121, right-hand column, paragraph 5 - pp. 4122, right-hand column, paragraph 4) in order to be able to develop an acoustic echo canceller that performs in actual usage (see pp. 4121, right-hand column, paragraph 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within Romesburg reference the coefficients as taught by Oh, Linebarger, Priest, Raghothaman since such combination would have been able to develop an acoustic echo canceller that performs in actual usage as suggested by Oh, Linebarger, Priest, Raghothaman in pp. 4121, right-hand column, paragraph 4.

However, the Romesburg and Oh, Linebarger, Priest, Raghothaman in combination does not explicitly disclose the adaptive filter coefficients are sign function.

Thus one of ordinary skill would have been motivated to seek an adaptive scaled non-linearity is a sign function in order to supply an actual working filter for Romesburg and Oh, Linebarger, Priest, Raghothaman in combination. Such embodiments would have been any known sign function such as one of Fujii et al. in the same field of endeavor.

Fujii et al. teaches an adaptive filter coefficients are a sign function (see col. 33, lines 18-38) so that a coefficient adjustment may be maintained without being stopped by the extreme reduction of the coefficient adjusting amounts (see col. 8, lines 57-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg and Oh, Linebarger, Priest, Raghothaman an adaptive scaled non-linearity that is a sign function, as taught by Fujii, since such combination would have provided a coefficient adjustment that may be maintained without being stopped by the extreme reduction of the coefficient adjusting amounts as suggested by Fujii in column 8, lines 57-59.

It should be noted that the Romesburg; Oh, Linebarger, Priest, Raghothaman, and Fujii in combination does not explicit disclose the filter coefficients in forms of:

$$h_{n+1} = h_n + \frac{\mu}{x_n^T} G_{nxn}\varphi(|en|)\text{sign}\{e_n\}$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter

that prevents division by zero; $|en|$ is the mean error; and $\{e_n\}$ is a sample of echo signal.

Thus one of ordinary skill would have been motivated to seek a filter coefficients of above form in order to supply an actual working filter for Romesburg and Oh, Linebarger, Priest, Raghothaman, and Fujii in combination. Such embodiments would have been any known sign function such as one of Kim and Efron in the same field of endeavor

Kim and Efron reference teaches an adaptive scaled non-linearity that is given by:

$$h_{n+1} = h_n + \frac{\mu}{x_n^T} G_{nxn}\varphi(|en|)\text{sign}\{e_n\}$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; $|en|$ is the mean error; and $\{e_n\}$ is a sample of echo signal,

(see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) in order to obtain robust power spectral density estimate (see pp. 1866, left-hand column, paragraph 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the combination of Romesburg; Oh, Linebarger, Priest, Raghothaman; and Fujii an adaptive scaled non-linearity that is given by the above formula as taught by Kim and Efron since such combination would

have obtained robust power spectral density estimate as suggested by Kim and Efron on page 1866, left-hand column, paragraph 1.

Regarding **claim 14**, Romesburg further teaches the echo canceller of claim 13, further comprising a double talk detector connected to the telephone circuit for disabling the update device in response to the detection of double talk on the circuit (see col. 5, line 45-47)

Regarding **claim 15**, Romesburg teaches a robust echo canceller (430; see col. 16, lines 44-60; see Fig. 4, and respective portions of the specification) comprising:

an adaptive filter for outputting an error signal in response to a detected echo signal (450; see col. 12, lines 14-33); and

means for supplying adaptive filter coefficients to the filter in element-wise fashion (see col. 13, lines 26-57).

However, the Romesburg reference does not explicitly disclose the coefficient update equation in form of:

$$h_{n+1} \quad = h_n + \mu G_n X_n (X_n^T X_n + \delta I),^{-1} e_n$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; and e_n is a sample of echo signal

Thus one of ordinary skill would have been motivated to seek a filter coefficient update equation of above form in order to supply an actual working filter for Romesburg. Such embodiments would have been any known sign function such as one of Oh, Linebarger, Priest, Raghothaman in the same field of endeavor

Oh, Linebarger, Priest, Raghothaman reference teaches coefficients given by

$$h_{n+1} \quad = h_n + \mu G_n X_n (X_n^T X_n + \delta I),^{-1} e_n$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; and e_n is a sample of echo signal,

(see pp. 4121, right-hand column, paragraph 5 - pp. 4122, right-hand column, paragraph 4) in order to be able to develop an acoustic echo canceller that performs in actual usage (see pp. 4121, right-hand column, paragraph 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within Romesburg reference the coefficients as taught by Oh, Linebarger, Priest, Raghothaman since such combination would have been able to develop an acoustic echo canceller that performs in actual usage as suggested by Oh, Linebarger, Priest, Raghothaman in pp. 4121, right-hand column, paragraph 4.

However, the Romesburg and Oh, Linebarger, Priest, Raghothaman in combination does not explicitly disclose the adaptive filter coefficients are sign function.

In the same field of endeavor, Fujii et al. teaches an adaptive filter coefficients are a sign function (see col. 33, lines 18-38) so that a coefficient adjustment may be

maintained without being stopped by the extreme reduction of the coefficient adjusting amounts (see col. 8, lines 57-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the Romesburg and Oh, Linebarger, Priest, Raghothaman an adaptive scaled non-linearity that is a sign function, as taught by Fujii, since such combination would have provided a coefficient adjustment that may be maintained without being stopped by the extreme reduction of the coefficient adjusting amounts as suggested by Fujii in column 8, lines 57-59.

It should be noted that the Romesburg; Oh, Linebarger, Priest, Raghothaman; and Fujii in combination does not explicit disclose the filter coefficients in forms of:

$$h_{n+1} = h_n + \mu G_n X_n R_{xx}^{-1}(n)[\varphi(|en| \odot \mathrm{sign}(e_n))]$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; R_{xx}^{-1} is the correlation matrix; $|en|$ is the mean error; $\odot$ **denotes elementwise multiplications** ; and $\{e_n\}$ is a sample of echo signal.

Thus one of ordinary skill would have been motivated to seek a filter coefficients of above form in order to supply an actual working filter for Romesburg; Oh, Linebarger, Priest, Raghothaman; and Fujii in combination. Such embodiments would have been any known sign function such as one of Kim and Efron in the same field of endeavor

Kim and Efron reference teaches an adaptive scaled non-linearity that is given by:

$$h_{n+1} = h_n + \mu G_n X_n R_{xx}^{-1}(n)[\varphi(|en| \odot \text{sign}(e_n))]$$

wherein h_n is the estimated echo path; μ is the overall step size parameter; G_n is the excitation matrix; X_n is the excitation vector; δ is the regularization parameter that prevents division by zero; R_{xx}^{-1} is the correlation matrix; $|en|$ is the mean error; $\odot$ denotes elementwise multiplications ; and $\{e_n\}$ is a sample of echo signal,

(see pp. 1857, right-hand column, paragraph 3 - pp. 1858, right-hand column, paragraph 2) in order to obtain robust power spectral density estimate (see pp. 1866, left-hand column, paragraph 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included within the combination of Romesburg; Oh, Linebarger, Priest, Raghothaman; and Fujii an adaptive scaled non-linearity that is given by the above formula as taught by Kim and Efron since such combination would have obtained robust power spectral density estimate as suggested by Kim and Efron on page 1866, left-hand column, paragraph 1.

Regarding **claim 16**, Romesburg further teaches the echo canceller of claim 15, further comprising a double talk detector connected to the telephone circuit for disabling the update device in response to the detection of double talk on the circuit (see col. 5, line 45-47).

Response to Arguments

12. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new grounds of rejection.

13. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

14. The following are suggested formats for either a Certificate of Mailing or Certificate of Transmission under 37 CFR 1.8(a). The certification may be included with all correspondence concerning this application or proceeding to establish a date of mailing or transmission under 37 CFR 1.8(a). Proper use of this procedure will result in such communication being considered as timely if the established date is within the required period for reply. The Certificate should be signed by the individual actually depositing or transmitting the correspondence or by an individual who, upon information and belief, expects the correspondence to be mailed or transmitted in the normal course of business by another no later than the date indicated.

Certificate of Mailing

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Assistant Commissioner for Patents
Washington, D.C. 20231

on _________.
(Date)

Typed or printed name of person signing this certificate:

____

Signature: _________________________________

Certificate of Transmission

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, Fax No. (703)_____ - ________ on ____________.
(Date)

Typed or printed name of person signing this certificate:

____

Signature: _________________________________

Please refer to 37 CFR 1.6(d) and 1.8(a)(2) for filing limitations concerning facsimile transmissions and mailing, respectively.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Con P. Tran, whose telephone number is (703) 305-2341. The examiner can normally be reached on M - F (8:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on (703) 305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Customer Service Office at telephone number (703) 306-0377.

cpt CPT
December 29, 2002

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